COVID-19 and the secret virtual assistants: the social weapons for a state of emergency

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Abstract

Technologies are ubiquitous in modern Britain, gradually infiltrating many areas of our working and personal lives. But what role can technology play in the current COVID-19 pandemic? At a time when our usual face to face social interactions are temporarily suspended, many of us have reached out to technology (e.g. Skype, WhatsApp, Facebook, Zoom) to help maintain a sense of closeness and connection to friends, family and vital services.

One largely unsung technology is the virtual assistant (VA), a cost-efficient technology enabling users to access the Internet of Things using little more than voice. Deploying an ecological framework, in the context of smart age-friendly cities, this paper explores how VA technology can function as an emergency response system, providing citizens with systems to connect with friends, family, vital services and offering assistance in the diagnosis of COVID-19.

We provide an illustration of the potentials and challenges VAs present, concluding stricter regulation and controls should be implemented before VAs can be safely integrated into smart age-friendly cities across the globe.

Keywords

Ecosystem, Age-friendly, Emergency Response, Technology, Society, Alert, Isolation, Loneliness

Introduction

Wicked problems are complex in nature with no prescriptive solution (Alford & Head, 2017), and the COVID-19 pandemic can be considered to be one such problem. The social consequences of the spread of the virus and governments' reactions to it around the world are not uninform. Indeed, in the UK specific populations in society (e.g. older adults, people with underlying, chronic health conditions) are advised by the UK Government to self-isolate for their own protection, not going out of their home for at least 12 weeks.

An ecosystem approach shows how people connect with their environments, highlighting how complex environments interact to shape individual behaviour. The smart age-friendly ecosystem (Figure 1) proposed by (Marston and van Hoof, 2019), integrates and illustrates how technologies interact with other societal factors to influence individual behaviour. However, as people's behaviour is changed in the midst of the crisis, such models will need revising. Even when we come out of the lockdown, behaviour may be changed forever; the world will be different.

<Insert Figure 1 around here>

Yet, now in this crisis we are examining how our individual ecosystems are adjusting to an alternative way of life, across the UK and worldwide. There is a need to re-examine existing issues older people face, for example with regards to loneliness and isolation, while also exploring new innovative approaches to how technology is being, or could be, used to help. This paper examines the hitherto untapped potential role of virtual assistants (VA) as one element of technology while people are isolated.

Isolation and loneliness

The consequences of prolonged self-isolation can be serious for those citizens such as older adults or those with chronic health and/or life-threatening conditions and disabilities (Burholt, Windle, Morgan & CFAS Wales team, 2017). In this current crisis younger populations are also vulnerable, placing many at risk of social isolation and loneliness from community groups (e.g. Church, Women's Institute etc.) sports clubs, friends and family members while changing their daily routine. It is these so called 'critical situations' (Giddens, 1979) such as the one we face now, in which loneliness can be triggered (Morgan 2018). Loneliness and social isolation can be temporary or chronic and these can have differential impact on health and wellbeing. While chronic loneliness and social isolation are associated with poor physical and mental health (Holt-Lunstad, Smith, Baker, Harris, & Stephenson, 2015; Valtorta, Kanaan, Gilbody, Ronzi, & Hanratty 2016), transient or temporary loneliness and social isolation is less likely to be associated with any long-term negative impacts on health and wellbeing. However, there are likely to be short term impacts on mental health if social connections cannot be maintained.

Social connections and interactions are considered integral to being human, underpinning positive wellbeing and good health (Dinkins, 2017). In times of uncertainty, human connection to loved ones and essential services (health and social care) becomes more pertinent.

For people who are at a very high risk are advised to follow shielding measures, for example older adults or young disabled adults with life-limited and life-threatening conditions (Walmsley, Earle, Tilley, Chapman, Ledger & Townson, 2015; Blackburn, Earle & Komaromy, 2014; Earle & Blackburn, in press), there is a heightened risk of feeling completely set adrift from society. For these specific populations and for all of us following Government guidance, COVID-19 may lead to significantly reduced connectivity to wider

society and loved ones, placing many of us at risk of unprecedented isolation and feelings of loneliness.

Thus, providing a sense of safety and support, technology has provided various communication tools (e.g. Skype, Viber, What's App), social media platforms (e.g. Facebook, LinkedIn, Instagram) and the telephone to facilitate new and emphasise greater connections, enabling many of us to connect with a familiar and friendly voice. In some instances, the affordance of communication tools can support group chats, with face-to-face contact, which may offer some comfort to the physical loss of hugging and being in the presence of friends, family members, and members of community groups and/or sports clubs. Such tools and social media platforms offer citizens the opportunities to create a sense that we're all in this together, connected, enhance a sense of belonging, and possibly reduce the feeling – at least the physical aspect – of being socially isolated.

Previous studies on housebound older people suggest that connections can be made remotely, even without recourse to technology, for example through "watching the world go" through windows (Musselwhite, 2018; Rowles, 1981). However, observing and self-narrating other people's behaviour is a key part of this; if people are staying at home more there is less opportunity for this to happen.

The UK Government directive at present is to maintain a minimum of two metres social distancing, no hugging, no touching and, as of the week commencing the 24th March, it has been suggested for couples who live apart to either commit to one another or take the risk of not seeing each other (Maidment, 2020), placing issues of social isolation and loneliness as important secondary public health concerns to us all. As of the 29th March, 2020 the deputy Chief Medical Officer Jenny Harris mooted how UK citizens and the Government were considering a possible lockdown for six months and possibly longer, with social distancing practices been in place until at least October 2020 (Tapsfield, 2020).

Due to the lack of UK citizens following social distancing directives, the UK Government have recently threatened even tougher lockdown measures (Savage, 2020), while over the weekend of the 27-30 March, the UK was witnessing police patrols up and down the country making sure people were sticking to the rules (Keogh, 2020; Saunt, 2020).

Conversely, with the ever-increasing measures and restrictions, technology has the potential to play a vital role, as a tool to maintain connections with friends and family. Recently, Marston, Musselwhite & Hadley (2020) discuss the role which technology can play to impact various communities and citizens during this crisis.

However, there is a particular type of technology that has received little attention in relation to scientific research and the potential benefits within different communities –VAs (Marston & Samuels, 2019).

VAs

VAs are the digital voices of the technological age, which include Alexa, Google Home, Google Mini and Siri. VAs require only a voice input to trigger a connection to make a contact, task, game, fact finding mission, purchase, access an e-mail account or to simply talk to someone (Harish et al, 2016). These devices sit silently (until called upon) in an individual ecosystem (e.g. living room, bedroom, kitchen), they are unobtrusive and easily accessed, removing the need to navigate through dense time-consuming computer interfaces, or fiddly virtual keyboards on a tablet, making them more accessible than most technologies.

Technology can be particularly challenging for older adults and people living with health challenges (particularly, though not restricted to, visual impairment, arthritis, cognitive impairment, fatigue) to interact with (Lisko, Tormakangas & Jylha, 2020; Genoe, Kulczycki, Marston, Freeman, Musselwhite & Rutherford, 2018; Vaziri, Aal, Rekowski, Kroll, Marston, Poveda, Gschwind, Delbaere, Wieching & Wulf, 2016; Wilkowska & Ziefle, 2014; Marston, Genoe, Freeman, Kulczycki & Musselwhite, 2019; 2016a; 2016b 2012; Uzor, et al., 2012; Chen & Chan, 2011). Using the power of voice, users can access information sources (e.g. radio, news updates, general facts, cooking recipes), formal services (e.g. takeaway, groceries, phone services, e-mail) and more importantly, maintain communication with relatives and friends.

One could argue technologies such as laptops, desktop computers and smartphones offer improved access to services. With many such technologies integrating VAs into their devices, this strongly suggests VAs bring something unique to the party – the individual ecosystem. Whilst the addition of a display maybe useful, the high costs associated with technology is often a barrier to access for citizens living on a budget (Park, Cho, Han & Kwon, 2017).

The COVID-19 pandemic brings two key issues into focus when considering technology. Firstly, the integral nature of technology to modern society and in national emergency situations. The second issue underscores the need for affordable and accessible technology. During the current social restrictions, many citizens, if not all, face economic uncertainty and many are at the risk of poverty. There is little merit in positing technology as a critical tool, if it is unaffordable and inaccessible, especially at this time.

Fortunately, the humble VA is an affordable and versatile piece of technology offering users a unique way to access key ecological systems and promoting wellbeing during COVID-19. Indeed, VAs provide users with a sense of presence and older adults are reporting the adoption of VAs as a personal friend (Pradhan, Findlater & Lazar, 2019). These are crucial factors when developing strategies to fight COVID-19.

VAs are unique in so much as they offer connections to digital services using voice alone, removing the need to acquire digital skills that many other technology types require. Whilst the user needs to use the correct trigger words to activate an action (e.g. “Hey Google, play BBC Radio 2”, or “Hey Google, what is the weather forecast today?”), these can be written down for individuals to access quickly and simply speak to the device. Even telephones can become challenging for some citizens to use if someone lives with a visual impairment. No other form of technology is as easy to interact with and offers connectivity to such a broad range of services across a user’s ecological system.

The advice from the World Health Organization (WHO, 2020) is that maintaining some sort of routine in the face of a pandemic is important for wellbeing during isolation for all of us. VAs can assist the user to develop new routines, whilst also learning current routines, followed by supporting users to maintain a sense of familiarity during what are unprecedented and strange times.

Positives and enablers to using and integrating VAs

Many countries such as the USA (Department of Homeland Security, 2020), Canada (Canadian Press, 2019), Australia and Portugal (Waterson, 2020) have emergency alert systems that deliver state/provincial information (e.g. tornado alerts, flooding and forest fires) to its citizens (Waterson, 2020).

Furthermore, Waterson (2020) notes how the aggressiveness of South Korea's emergency alert system may have saved many of its citizens from coming into contact with infected citizens (Waterson, 2020). As COVID-19 continues to spread across Europe and the world, many countries and their respective governments are now building their own emergency alert system (Waterson, 2020).

At present there is no emergency alert system set up by the UK Government – in light of COVID-19, and the floods in late 2019 and at the beginning of 2020, this may change. However, Waterson (2020) notes there has been internal Government discussion surrounding an emergency alert system for the UK. Yet, traditional forms of media, as well as social media platforms such as Facebook, are taking it upon themselves to communicate information to their respective users during the COVID-19 pandemic.

In a recent announcement (29 March, 2020), the UK Government have set up a web and telephone portal for the 'most vulnerable' to access medical support and arrange food supplies. It is likely adults without access to the internet, an appropriate form of technology and digital skills are likely to be reliant on the telephone. This could be laborious and upsetting, hearing how thousands of 'vulnerable people' are experiencing long telephone wait times. In this scenario, a VA could offer an efficient way for the 'most vulnerable' to connect with Government and vice versa.

VA's could be coupled with the Internet of Things (IoT); the bringing together of smart internet-enabled everyday objects has potential to help remind or alert people. The joining together of household items with the VA as the interface could help older people with shopping, knowing when the fridge is running low of certain types of food, and possibly coordinating deliveries with local stock, reducing the need for stockpiling and under-supply. These could be changed at times of emergency to reflect social needs. However, this is a long way off from being the norm.

Let's take the scenario of VAs being installed throughout all ecosystems (e.g. own home, residential and extra care housing), and in such crisis as COVID-19, or similar emergencies (e.g. flooding or tornados), VAs and IoTs can provide a myriad of information. Such information can be shared to the residents, staff, as well as the local community, and support networks etc. Depending on the emergency, and in the case of COVID-19, a variety of information can be shared to multiple users via the VA device and standard SMS. Table 1 displays the type of information that could be shared and provides examples.

Table 1. Various types of information shared by virtual assistants

Item shared by a virtual assistant	Example
Health information	
Social housing	• Any repairs booked • Concern about paying rents
Food banks	• Nearest food bank(s) • Opening hours • Additional information – low on stock etc.
Public transport	• Taxi companies offering alternative services (e.g. click and collect for groceries) • Prescription collection • Reduced timetables

Educational resources	• All age groups in formal education • Nutritional home cooked meals on a budget
Local health teams	• Falls related/detection • Mental health • Maternity/midwifery • Social services • Oncology
Government websites	• Housing related (ownership and rental) • Welfare (universal credit) • Self-employment • Health directives
Social connections	• Easily connect with friends and family • Be-friending services
Safe words	• Summon help/assistance immediately
Alert the emergency services	• In case of a fire in the home – smoke detector
Social events	• Matched to person's likes/dislikes
News updates	• Daily updates on the national/local emergency
Universal - multilingual	• Multiple languages • Intergenerational
Infection control	• Little or no requirement to physically switch lights • Reduction of contact time, with potentially contaminated surfaces
Power/electricity	• Uses little power resource • Cost effective

In Table 1, we have provided concepts and associated examples of how VAs and IoTs could be implemented into various housing ecosystems to provide additional services and information. Below we describe some, not all, of the suggested features, because some of the suggestions above are self-explanatory.

Safe words and domestic abuse

It has been reported across various media outlets that there is a (potential) rise in domestic violence and incidents occurring during this pandemic (Snuggs, 2020; Women's aid, 2020). The UK Government have posted guidance for victims of domestic abuse on their website, including the provision of safe accommodation (2020). Moreover, a VA has the potential to hold 'safe words' that a victim of abuse could use, which would in turn alert emergency services. There are issues surrounding this, such as the abuser realising the safe word has been used or identifying the safe word and then deleting it. However, further research, for example participatory workshops, would be needed with key stakeholders to ascertain the possibility of VAs being suitable for this.

Alert the emergency services

An example of how the emergency services could be contacted via a VA is in the case of a house fire, where the smoke detector is connected to the VA, which in turn has the potential to alert the fire service as well as the respective resident(s). Incorporating such a safety feature into a smart age-friendly ecosystem (Marston & van Hoof, 2019) could offer

reassurance for all residents, support network(s) including carers and the neighbourhood. Furthermore, this feature would be suitable for those who may not be able to move quickly, or who may not be able to move away from a fire quickly enough upon discovery. Furthermore, individuals may panic, and as a result may become disoriented as to accessing a mobile phone or a house phone.

Universal – multilingual and intergenerational
Although English is a universal language, for many citizens, it is a second, third or even fourth language for some individuals. In such a crisis, having a VA device that facilitates multiple languages is key to ensure information and directives are understood by everyone. However, while some citizens may not be able to speak English, their children and/or grandchildren may live with them. VAs have the potential to provide intergenerational engagement and support, and during COVID-19, no actual skills or digital literacy are needed or would be needed (if retrofitted into the ecosystem and/or someone else set it up).

Infection control
During crises such as COVID-19, limiting our surface contact is key – especially if individuals are frontline, key workers. In particular, carers who are going into citizen's homes to ensure they are safe, while also risking their health and potentially contracting COVID-19.As we have heard and read from citizens, COVID-19 flaws individuals who were previously fit and healthy, in some cases resulting in death (Middleton, Borland, Dolan & Allen, 2020). Yet, as newspaper articles (Readfearn, 2020; Simons, 2020) have demonstrated, no-one is excluded from the COVID-19 club.

VAs such as Alexa can be connected to doorbells with additional implementations like cameras, can provide residents with additional security and reduce infection transmission. Connecting Alexa to the doorbell alerts the resident(s), who in turn can speak to a delivery person to leave the package outside, thus, again reducing the risk of infection. Similarly, internal doors can be connected to such a device, which can be activated (to be opened), which can in turn reduce the risk of cross infecting the residents in the ecosystem. This notion would be and is ideal for residents who are deemed high risk (70+ years) as well as those citizens who are vulnerable due to chronic health condition(s). Integrating this approach via a VA reduces the risk of cross infection with other residents in the ecosystem.

Thus, VAs and IoTs facilitate users to conduct a series of commands to turn lights and music on and off. Marston and Samuels (2019) describe the existing and various features that are employed by VAs within homes, in particular for users who require additional assistance due to chronic health conditions and/or disabilities. An additional overview is available, relating to their published work, providing a synopsis of the paper, and the practicalities of intergenerational living and behaviour in regards to technology and VAs (Marston, 2019).

COVID-19 diagnosis
Surprisingly, or rather inspirationally, research is exploring whether COVID-19 can be diagnosed by analysing the sound of a person's voice. Corona Voice Detect, a collaboration between Carnegie Mellon University (USA) and Voica.ai (Schwartz, 2020), are currently collecting a dataset of the voices of infected people across the globe in the hope of identifying voice biomarkers for COVID-19. In the USA, VAs are being used to assist people to self-diagnose COVID-19 by posing a series of questions and providing advice accordingly (Porter, 2020). Such tools are powerful in a pandemic context, offering the potential to enable a prompt diagnosis to feed into the epidemiology of the disease.

Envision the following, you think you are showing mild symptoms of COVID-19. You record your voice on your smart speaker, indicating it is likely you have COVID-19. Your data is shared with your local general practitioner surgery or healthcare provider, who in turn arranges a COVID-19 test to be delivered to your door, and within 48 hours a diagnosis is confirmed. Your total confirmed diagnosis time has taken 72 hours and is immediately mapped to a national tracker. Enabling an accurate picture of COVID-19 at both local and national scales is imperative, to measuring how effective social distancing and self-isolation has been.

Power/electricity

VAs require little power, costing a user approximately £1.49 per year (Kingsley-Hope, 2019), assuming the VA is in a permanent standby mode and two hours of use per day. However, there are possible alternatives to running such devices and IoTs, including renewable energy, including solar and wind power. Whether a house or a residential facility is being retrofitted, the options of including solar panels on to the roof may provide additional costings within the environment as the user builds their smart home ecosystem.

However, like many technological devices, VAs are not without their own issues. For example, troubles can arise when the VA device starts making errors, or mistakes. Like many technologies, VAs require a stable internet connection, yet in some locations across the UK the infrastructure for a stable, flowing internet is rather precarious. Additionally, for some citizens, who are on fixed incomes, or do not perceive the benefits of installing an internet connection, they too will be missed. It is likely that some of these citizens are the most vulnerable as well as at high risk from COVID-19.

COVID-19 has, undoubtedly, placed unprecedented pressure onto the UK internet infrastructure, with reports of networks slowing down, or a rationing of sorts has taken place. For example, streaming services (e.g. Netflix, Amazon Prime Video, YouTube) rationing services, by lowering its speeds and streaming quality to cope with the increase strain experienced by the network (Karunaratne and Almeida, 2020). This is further evidence of a poor, insufficient and inadequate existing internet infrastructure, which requires greater attention by all respective key actors.

However, service providers such as British Telecom (BT), Talk Talk, Sky Broadband and Virgin Media seem to be maintaining the infrastructure (Jackson, 2020). Citizens who are self-isolating or are vulnerable, by virtue of health status or circumstance(s), will be provided with priority repairs and alternative communication tools should their connection fail completely (PA Media, 2020). This offers some reassurance to these respective citizens, though the issue of affordable internet subscription and whether or not there is sufficient good quality internet coverage across the country is questionable. Without a stable and steady internet connection, VAs are unable to function, becoming little more than new age ornaments collecting dust on the shelves.

Other issues surrounding inclusivity centre on the VA's ability to understand the citizen. Citizens living with speech impairment may have difficulty in communicating effectively with the VA, risking a 80-90% word error rate (De Russis & Corno, 2019).Misinterpretation of user input may reduce the efficacy of the technology, though enunciating words and speaking loudly can overcome these challenges (Pradhan, Mehta & Findlater, 2018). Furthermore, there are issues of maintaining a sense of positive identity and good self-esteem; to constantly battle to be understood seems undermining. Imagine trying to contact a friend, family member, or worse, trying to summon help and being repeatedly misunderstood.

At worst, this could prevent users accessing vital services, resulting in greater contribution to a sense of volatility.

Data protection and privacy
With any kind of technology or associated platform, data protection and privacy are key to ensuring users' data and information is kept safe. This too is the same for VAs. In 2018, citizens and business (large or small) had to become GDPR compliant (Information Commissioners Office, 2018). What is problematic when using VAs and potentially IoTs is where the data is stored. Currently, data is stored on a cloud and is easily accessible via a desktop/laptop or smartphone. However, if the cloud is located outside of the UK jurisdiction, then it may not be governed by UK data protection legislation, threatening the privacy of users and giving rise to a surveillance society.

Robust safeguards need to be in place, to protect users' privacy, dignity and confidentiality if our suggestion of using a VA as an additional state emergency alert was to be enacted; the UK Government would have to ensure all details would be safely secured and are governed by UK legislation. Furthermore, with VAs and IoTs, what protections are in place? We have seen in the last 12 months or so how VAs are potentially invading the privacy of their users, without the respective users knowing (Lynskey, 2019; Vlahos, 2019; Taylor, 2019). To drive business transparency is key and user control over what is and what is not shard is important if VAs are to be fully integrated into our personal ecosystems.

The issue in the context of VAs is perhaps unique as the device is 'always on' and ready to respond, potentially allowing the device to continually record snippets of our lives, to create images of our behaviours and personal details of our lives. This is, we argue unacceptable and unethical without clear and accessible user consent, with concerns of what a lay person can understand relating to privacy data notes explicitly indicating where and how data is stored. All actors including the UK Government have to understand that tracking of users' activity may occur. Yet, if such a device were to be used for state emergencies as an alert system, then there would need to be clear adherence to current legislation.

Implementing VAs and IoTs into individual ecosystems for positive benefits and for good, while well intentioned, there are citizens who would disagree, and suggest this is big brother, as George Orwell noted in his book - 1984 (2004). The notion and surveillance practices of the DDR (Deutsche Demokratische Republik – East Germany) state prior to German unification (Bundeszentrale für politische Bildung, 2010; Bundesarchiv, 2013) oversaw the day-to-day activities of its citizens via the Stazi and informers (e.g. family members, work colleagues, friends and neighbours) (Funder, 2011; Vaizey, 2017; Schaer, 2009; Curry, 2008; Hall, 2006). This is an example of how surveillance and associated technologies and information can be viewed negatively and can impact badly on one's life or that of your family (Funder, 2011; Vaizey, 2017; Schaer, 2009; Curry, 2008; Hall, 2006).

Summary
In this current crisis, all citizens and governments are finding their feet with the day-to-day realities of COVID-19. Using evidence-based research and modelling, the UK Government is following advice from the academic community, and changes are made daily and are shared via media outlets, a live daily statement and social media platforms (e.g. Twitter). The latter is shared by political journalists such as Chris Mason, Laura Kuenssberg, Adam Flemming and Katja Adler, who report daily via their own Twitter profiles as well as The Coronavirus Newscast (BBC, 2020).

However, we have to think of the future now! At present we are in Round 1 of COVID-19, and while it may disappear in the coming months, there is the likelihood that it will rear its head again (Lintern, 2020) once restrictions are reduced, and citizens start to have some normality back into their lives.

Whilst VAs offer clear advantages and a world of possibilities at a time of uncertainty, it is not without challenges. Technology offers a myriad of new and exciting ways of working, collaborating and interacting with the world around us, as well as looking out for and supporting the most vulnerable people in our communities and society.

Therefore, with this thinking, VAs could prove an essential social weapon in our fight against COVID-19. VAs are a versatile, adaptive technology with the potential to provide thousands, if not millions of people across the globe new and greater opportunities to interact with society and their wider communities in dynamic ways during emergency and crisis states.

Whilst the threat of COVID-19 is high and the future is uncertain, we put forward VAs as a formidable tool to preserve social connectivity. VAs could save lives, enhance wellbeing and form a central social weapon in our fight to maintain cohesion in chaos during the COVID-19 pandemic.

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Figure legends

Figure 1. Smart age-friendly ecosystem framework (Marston & van Hoof, 2019)